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ABSTRACT

Economic changes and demographic realities may require fundamental changes in what individuals need to learn, how and when they need to learn it, and who needs to learn it. Examination of three strands of research should clarify these issues. The first strand consists of research on changes in the nature and structure of work and in the capacities required for work: it bears on what schools should teach. This research shows that both the service and manufacturing industries are moving from a production-oriented to a product-oriented world, from mass production to flexible production. These changes require both basic skills and more higher order thinking, even for jobs that are usually thought of as lower skill. The second strand of research relates to how schools should teach. This strand is pioneering work in cognitive psychology on nonschool learning and its implications for how formal learning is restructured. This work implicitly challenges the traditional distinctions between head and hand, academic and vocational education, education and training, and school-based and work-based learning. The final research strand involves at-risk learners as rational decision makers. This research suggests that school-based learning is not particularly related to out-of-school activity for any individual; however, what is taught in traditional schools and remedial programs seems less relevant to those persons who lack the ability or desire to enter professional occupations. (KC)

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EDUCATION AND THE ECONOMY: WHAT SHOULD WE TEACH? WHEN? HOW? TO WHOM?

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PREFACE

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This is a speaker series on adult learning. However, tonight I want to talk to you about elementary and secondary education. Although I will focus on pre-adult education, let me make--but not return to--the point that adult education, including corporate and adult literary programs, seems to have problems more similar to those of K-12 than any of us had suspected.

Research that we are conducting at the Institute on Education and the Economy at Teachers College, Columbia University, increasingly convinces me that American economic changes and demographic realities may require fundamental changes in **what** individuals need to learn, **how** they need to learn it, **when** they need to learn it, and **who** needs to learn it. I am not sure what this restructuring will ultimately look like in our schools, second chance programs, or corporate education; how it can be made to happen; or how long it will take. For this reason I often talk about these issues as shadows in the wings--the next educational reform. However, I can briefly describe three strands of research that should help clarify the issues for both advantaged and disadvantaged populations, jog our assumptions, and move us closer to ideas of what these changes might be.

The **first** strand consists of research on **changes in the nature and structure of work and in the capacities required for work**; it bears on **what** schools should teach. My comments here are based primarily on a NCEE research program conducted by Drs. Thomas Bailey and Thierry Noyelle, economists at Columbia University. I discuss changes in two industries: banking, a service industry, and textile manufacturing. Let's start by looking at Figure 1 for a moment. [See page 2.] We usually see a graph like this for manufacturing industries, where concepts such as unit output and mass production have an intuitive meaning. However, as I discuss later, concepts such as craft production,[1] mass production, and flexible production have analogues in service industries. Although I will discuss flexible production later, the fact that it falls between craft and mass production in this figure begins to give you some sense of this concept. Flexible production tries to combine the customizing implicit in craft production at the cost savings of mass production. From the point of view of human capital development and schooling, **the key change in the economy for both the manufacturing and service sectors is a shift from mass production to flexible production.**

The **banking industry** has been subject to three forces:

- o increased international competition;
- o increased domestic competition as the result of deregulation; and
- o computerization.

Before computerization and de-regulation, banking involved few services or "products", and its mode of operation was a mass production mode--the rapid and accurate processing of millions of a small number of different types of

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[1] By "craft production" I mean highly customized production, often with hand tools and labor-intensive. For example, you can buy "ready-made" bookcases or hire a carpenter to build them into your home, the former being mass production and the latter craft production.

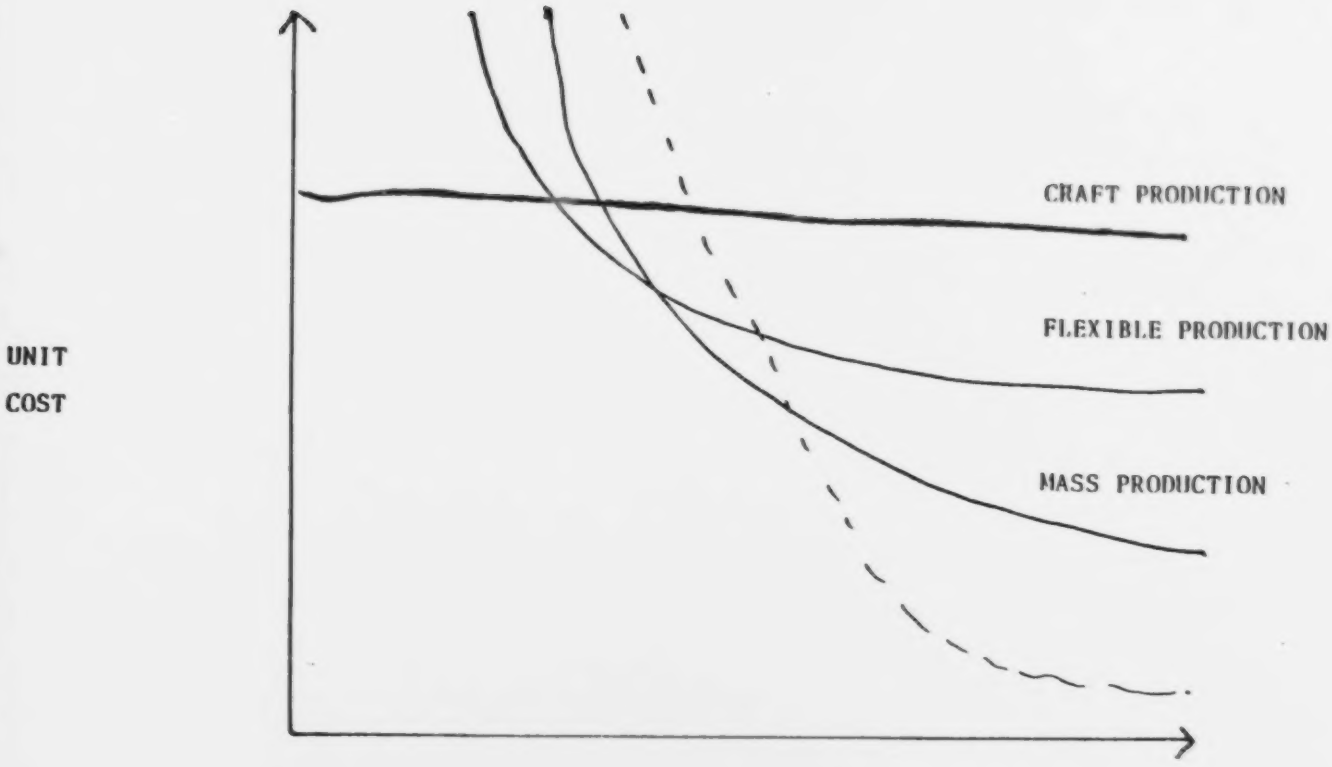
CRAFT PRODUCTION
FLEXIBLE PRODUCTION
MASS PRODUCTION
UNIT
COST
UNITS

Figure 1

transactions. During this era top bank management consisted of college graduate generalists; the bank branches operated with a branch manager, assistant manager, head teller, tellers, and clerk/typists who did the routine paperwork for activities such as opening accounts. The tellers were usually high school graduates with traditional accounting skills, and promotions to low level management came from this group.

In the last decade bank de-regulation has generated an explosion of services, as banks compete for market shares. This explosion drives banks toward a market and customer orientation--toward customizing. In other words, it has forced banks out of a mass production mode toward a flexible production strategy, with consequent changes in skill requirements and staffing patterns.

Today the teller job is highly routinized, simply a human alternative for customers who do not like to use automated banking services. The desk jobs, previously the clerk/typist jobs, are still the jobs that deal with customers' service needs. However, individuals in these jobs now must be able to analyze a much wider array of the customer's financial needs, understand the array of the bank's financial services, and, if possible, produce a match--in other words, make a sale. Banks find that they can hire part-time and less educated help for the highly routinized teller jobs, but must hire college graduates for what used to be the clerk-typist jobs. Banks find that they need people who can analyze and deal systematically with an array of data. Promotions now come out of the desk jobs, not the teller jobs--in fact, tellers are essentially isolated from promotion opportunities in the bank. At the same time, the skill requirements at the top of the bank have also changed. Banks now need, not college graduate generalists, but highly trained specialists--financial analysts and computer systems analysts, for example.

The **textile industry** competes on the basis of cost, quality, service, and product choice. During most of the post-war era, the U.S. textile industry focused on cost-cutting through the rationalization of the production of long runs of fabric--in other words, moving to the dashed line in Figure 1. Since textile production still requires large quantities of less skilled labor and the basic textile technology has diffused widely, the U.S. industry has been vulnerable to competition from countries with cheap labor. In 1980 imports constituted 17 percent of the domestic textile market; by 1986--just six years later--this had increased to 36 percent. In the face of this competition U.S. firms have entered a new wave of technological modernization and automation, the industry moving from forth-eighth out of sixty-one manufacturing industries in 1960 in average age of equipment to second by 1980.

However, developments in textile markets--indeed, in markets for almost all goods and services (recall banking)--have put limits on the industry's ability to use a mass production strategy. The greater segmentation of markets and the faster changing of styles have shrunk the market for large production runs of identical fabric. Even such a staple mass-produced commodity as denim now comes in dozens of weaves, colors, and finishes. Faster changing seasons have also had their effect. In apparel, styles become obsolete much more rapidly. Thus, apparel makers are less likely to order large quantities of the same material. The changes in styles are reflected in increases in stock-outs and

markdowns. Forced markdowns, which are necessary when retailers fail to sell items during the appropriate season, have increased by 50 percent during the last decade. Industry estimates suggest that losses from stock-outs, which occur when retailers run out of hot items, amount to 8 percent of sales.

Among U.S. textile producers it has now become an article of faith that the textile industry must become more "market driven"--that is, the industry must be capable of producing shorter runs of many more styles. Managers of every mill studied reported increases in the number of styles produced--for example, from three to thirty-five in two years; from one hundred to three hundred in five years.

In other words, although there will always be a market for basic textiles produced in long runs, the industry as a whole must also be able to produce a wider variety of goods, on shorter notice, and at a reasonable cost--in other words, must increase flexible production. The development of flexibility in production is fundamentally a process of reducing the cost differential between standardized goods produced in long runs and a more varied output produced in smaller batches. Custom-made products could always be acquired at a price. Ever since Henry Ford mobilized the labor of low skilled factory workers through the assembly line to replace teams of skilled workers, technological innovations, at least in the United States, have almost always been synonymous with specialization of labor and mass production. Flexibility has usually been achieved by reversing Ford's process, moving back up the range of skill levels, shifting from specialized to general purpose tools and machines, and reorganizing how people get the work done.

What has happened to skill requirements in the textile industry? In this industry most jobs are machine operator jobs (lower skilled) or machine maintenance jobs (higher skilled). The ratio between the two is changing, from 4.2 operators to one technician in 1975 to 3.5 operators to one technician in 1985. For the operator jobs, technological innovation means that each particular task is easier. However, this narrow conception of skills is misleading; many operator jobs today are more demanding. First, modern looms, winders, open-ended spinning frames, and programmable knitters are much more expensive than the equipment they replaced. Operators must now try to prevent machine stoppages--"down-time" is now much more costly. This requires a broader understanding of the production process within which the operator works. It is no longer enough for individuals just to understand the particular task to which they are assigned.

Second, because of the increase in the number of styles produced by each mill, many operators are likely to be engaged in a greater variety of activities and in more of the activities necessary for changing styles. As a result, in addition to a greater emphasis on prevention, some firms are experimenting with broader job definitions and teamwork strategies, and workers in the industry now have less well-defined jobs in a more uncertain environment.

Third, textile firms are also becoming more actively involved with working jointly with clients in developing new styles and fabrics. So far, at least in the firms visited for this project, this strategy does not seem to have had

much of an impact on the shop floor, but forward-looking firms are starting to consider how the operators could contribute. The same could be said for on-going technological innovations. Many of the most important changes have been small adaptations of existing machines, and operators could make important contributions to these efforts.

The higher level positions in the mills also need greater skills and educational preparation than they did in the past. In the textile industry, the skilled occupations involve machine repair. In the past, textile machines were intricate, but the mechanical principles underlying their construction were not complicated. How these machines operated could be visually observed, and experience that many workers had in their own homes working on automobiles or farm machinery was relevant to fixing them. Loom fixers and mechanics in spinning and knitting mills were almost always promoted form the ranks of machine operators. Working around the machines had already given them a feel for what was necessary, and the additional training needed to become a fixer was acquired on the job with little or no formal instruction.

This situation has now changed. Most machines now have microprocessors and other electronic components, as well as sophisticated sensors and yarn splicers and knotters. This equipment is well beyond the experience that most workers get in homes and on farms. Since important machine components are not visually observable, operating the machines does not provide much of a sense of what it takes to repair and maintain them. In other words, to understand, diagnose, and fix the new machines, technicians have to be able to represent their structures and processes symbolically in their heads. To do this they have to be able to follow complicated manuals, diagrams, and updates provided by the manufacturers. Literacy requirements have accordingly shot up; the mills can no longer fill all of the technician slots from their traditionally semi-literate operator labor pool; and states in which the mills are concentrated, such as the Carolinas, suddenly have mill owners' support for higher quality elementary and secondary education.

In sum: In both the service and manufacturing industries we are moving from a production-oriented to a product-oriented world, from mass production to flexible production. In all of the industries studied, Bailey and Noyelle have found that increased competition, volatility, and uncertainty in the market have created strong pressures on all levels of the production process to be more responsive to changes in tastes and demand. Indeed, it has become increasingly difficult to separate the marketing and product development functions from the production process itself, and this has profoundly disrupted the traditional production technologies.

Although ability to work on new machines is important, many of the most important changes cannot be understood as quantitative. Asking whether the work requires "more" or "less" skill inevitably focuses the analysis on limited and often secondary aspects of the transformation underway. Productivity gains are coming as much from changing the way that workers work together, their orientation towards their work, and the nature of their responsibility and involvement in the firm's changing strategy and orientation towards the market as from applications of new technology. While many jobs used to be based on the repetition of a particular set of well-defined tasks,

jobs now are more likely to demand varied and unpredictable responses to a variety of stimuli and information. Employment now involves interaction in constantly changing ways with production technology. The spread of micro-electronics and related technologies does not just result in new machines that must be mastered, but in a much deeper change in the way production is organized and the ways that workers relate to the production process and to each other.

Let's now think about what these industry studies imply for our educational reform objectives. They certainly imply the need for good basic skills--for example, recall the higher literacy requirements for textile mechanics. However, I argue that they also imply the need for higher order thinking, even for jobs that we usually conceive of as lower skill. Let's take a moment to define higher order thinking--we tend to use this phrase rather casually. In a recent publication, Lauren Resnick, a cognitive psychologist at the University of Pittsburgh, suggests that higher order thinking:

- is **nonalgorithmic**--the path of action is not fully specified in advance.
- is **complex**--the total path is not mentally "visible" from any single vantage point.
- often yields **multiple solutions**, each with costs and benefits, rather than unique solutions.
- involves **nuanced judgment** and interpretation.
- involves the application of **multiple, sometimes conflicting, criteria.**
- involves **uncertainty**--not everything bearing on the task is known.
- involves **self-regulation** of the thinking process, not regulation by others.
- involves **imposing meaning**, finding structure in apparent disorder.
- is **effortful**. (Lauren Resnick, Education and Learning to Think, National Academy Press, 1987, p.3)

Let's look again at how work has changed: the need to deal with uncertainty, to understand the firm's market environment, to understand the organizational context in which one's job is embedded, to anticipate, to deal with the unfamiliar and with discontinuity. There is a stunning parallel between these changes in the nature and structure of work and the defining characteristics of higher order thinking.

As Resnick (1987) and others point out, American education, like other industrialized countries, has harbored two quite distinct educational traditions--one concerned with elite education, the other with mass education. These traditions conceived of schooling differently, had different clienteles, and held different goals for their students. In educational institutions

aimed at the elite in the population, higher order thinking skills are nothing new. They represent what might be called the "high literacy" strand in the history of education, as opposed to the "low literacy" tradition, underlying mass education and aimed at producing minimal levels of competence in the general population. Resnick notes that "Although it is not new to include thinking, problem solving, and reasoning in **someone's** curriculum, it is new to include it in **everyone's** curriculum." (p.7) I suggest to you that this is precisely the challenge ahead of us--to make thinking and problem solving a regular part of a school program for all of the population, even minorities, even non-English speakers, even the poor--to assume that all individuals, not just an elite, can become competent thinkers.

What this implies is that improving basic skills is not a sufficient objective for the educational reform movement or for how we often conceive of literacy programs. It also implies that the methods now being used to hold schools accountable--student scores on multiple choice tests of basic skills--militate against structuring the learning of subject matter to encourage the development of higher order cognitive thinking. **Remember, you always get the performance you test for.** Multiple choice tests, although cheap to score, implicitly presume that "competence" is the ability to retrieve the "right" facts from a cognitive warehouse of facts. By definition, there are no right or wrong answers in the higher order cognitive world--only better and worse thinking. In making this comment, I do not mean that schools should not be held accountable or that students do not need to master certain "facts". I do mean that accountability that has been equated with scores on multiple choice tests encourages routine drill in bits and pieces.

Before I leave the subject of higher order cognitive thinking, let's quickly talk about changes in **when** schools should teach these skills. Again, let me quote Resnick:

> The most important single message of modern research on the nature of thinking is that the kinds of activities traditionally associated with thinking are not limited to advanced levels of development....[T]hese activities are an intimate part of even elementary learning....In fact, the term "higher order" skills is probably itself fundamentally misleading, for it suggests that another set of skills, presumably called "lower order," needs to come first. This assumption ....[i]mplicitly ....justifies long years of drill on the "basics" before thinking and problem solving are demanded....[R]esearch suggests that failure to cultivate aspects of [higher order cognitive] thinking may be the source of major learning difficulties even in elementary school. (Lauren Resnick, Education and Learning to Think, National Academy Press, 1987, p.8)

The second strand of research relates to **how** schools should teach. This strand is pioneering work in cognitive psychology on non-school learning and its implications for how we structure formal learning. A distinguished contributor to this work is Dr. Sylvia Scribner, a professor on CUNY's graduate faculty whom we are also fortunate to number among the Institute's research staff. At the heart of her work is the presumption that intelligence and expertise are built out of interaction with the environment, not in

isolation from it. **This work implicitly challenges our traditional distinctions between "head" and "hand", between "academic" and "vocational" education, between "education" and "training", and between school-based and work-based learning.**

Coming out of this stream of research is a much clearer sense of how school-based learning and non-school learning differ from each other. Lauren Resnick compellingly summarized several of these differences in her Presidential address at the American Educational Research Association's 1987 meeting. She delineated four broad contrasts between in-school and out-of-school mental activity that raise profound questions about the utility and effectiveness of schooling for all non-school activity, including work of all types and for all learners, whether at-risk or not-at-risk.

The first contrast is between **individual cognition in school versus shared cognition outside**. For the most part, school is designed so that one student's success or failure at a task is independent of what other students do (aside from grading on a curve). By contrast, a great deal of activity outside of school is socially shared: work, personal life, and recreation take place in social systems in which what one person is able to do depends fundamentally on what others do and in which "successful" functioning depends upon the mesh of several individuals' mental and physical performances.

The second contrast is between **pure mentation in school versus tool manipulation**. In school, the greatest premium is placed on "pure thought" activities--what individuals can do without dependence on "external crutches"--whether books and notes, calculators, or other complex instruments. While some of these tools may be used, even encouraged, during "learning", they are almost always absent during tests of performance. Thus, school becomes an institution that values thought that is independent of the physical and cognitive tools that are a vital and defining part of virtually all practical activity. Out of school, by contrast, most mental activities are intimately involved with and shaped by the physical and intellectual tools available, and the criteria for competence include the expert use of tools.

The third contrast is between **symbol manipulation in school versus reasoning about things and situations that make sense to people outside of school**. School learning is mostly symbol-based, to such an extent that connections to the things being symbolized are often lost. Outside of school, actions are intimately connected with things and events, and because one is engaged with things and situations that make sense to people, people do not fall into the trap of forgetting what their calculations or their reasoning is about. Their mental activities make sense in terms of their immediate effects, and their actions are grounded in the logic of immediate situations. In school, however, there is a very large tendency for symbolic activities to become detached from any meaningful context. School learning then becomes a matter of learning rules and saying or writing things according to the rules. This focus on symbols detached from their referents can create difficulties even for school learning itself. For example, it can lead to systematic and persistent errors of a kind that seem virtually absent in practical arithmetic.

The fourth contrast is between **generalized learning in school versus situation-specific competencies outside**. In school we aim for general, widely usable skills and theoretical principles. Indeed, the major claim for school-type instruction is, usually, its generality and power of transfer. Yet outside, to be truly skillful, people must develop situation-specific forms of competence. The "packages" of knowledge and skill that schools provide seem unlikely to map directly onto the clusters of knowledge that students will actually use in their work. This seems true even for highly technical knowledge, where schooling is intended to provide direct professional training. Studies of expert radiologists, electronic trouble-shooters, and lawyers all reveal a surprising lack of transfer of theoretical principles, processes, or skills learned in school to professional practice. All of this points toward the possibility that very little can be transported directly from school to out-of-school use. Both the structure of the knowledge used and the social structure of its use may be more fundamentally mismatched than we had previously thought.

Resnick qualifies this last point by noting what economic distinctions between general and specific human capital assume: **situation-specific learning by itself is very limiting**. Studies have shown that when the situation is changed from the familiar--for example, by asking bookies in Brazil to accept unusual bets that cannot be constructed from their tables (Carrahers and Schliemann)--unschooled individuals have a great deal of difficulty and may fail entirely. Schooled people do better, although--and this is an important point--they rarely use the supposedly general algorithms that they have been taught in school and instead invent new solutions specifically appropriate to the situation at hand. (Lauren Resnick, "Learning in School and Out," Educational Researcher, Vol.16, No.9, December 1987, pp.13-20)

These contrasts stimulate us to rethink--radically rethink--**how** we teach in school. The first contrast, **individual cognition in school versus shared cognition outside**, argues for much more team and co-operative learning, the student being held accountable for both individual and team performance. Individual and group tasks are not the same; effective functioning alone does not necessarily mean effective functioning within an interdependent work group; and many non-school performance situations require interdependent functioning. For example, pilot error accounts for an increasing percent of fatal airline crashes worldwide, and many analyses have pinpointed poor team performance as an important component of that error.[2]

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[2] As a recent New York Times article on cockpit error observed, "Two- and three-man airline flight crews...often don't work well together." In one example, the article noted a sharply critical FAA report on a major airline that had recently experienced several serious near accidents: "There is no evidence that _____ crews are (on the whole) either unprofessional or purposefully negligent....Rather...crew members are frequently acting as individuals rather than as members of a smoothly functioning team." (William Stockton, "Trouble in the Cockpit," New York Times Magazine, March 27, 1988, pp.38-40, 60, 63, 66-67.)

Resnick's second contrast--**pure mentation in school versus tool manipulation outside of school**--suggests that student performance be judged relative to the student's abilities to make effective use of tools, not independent of them. A related contrast that Resnick does not isolate is **mastery of and retrieval from a defined body of codified, structured knowledge in school versus the mastery of uncodified, emergent and evolving systems outside of school.** Increasingly, non-school settings demand that we cope with the unprecedented and with information that is neither limited nor orderly. This reality puts a premium on the ability to create structure--on knowing how to learn--and on skills at locating and organizing social and technological resources to expedite learning. These two contrasts argue that school should include learning situations where not only students, but also teachers, do not know the answers. Here "teaching" means showing how one effectively obtains and structures the knowledge needed to create a basis for orderly action. In this view, students should be evaluated not just for having the right answer, but also for figuring out how to get it.

The third contrast--**symbol manipulation in school versus reasoning about things and situations that make sense to people outside of school**--suggests instruction in the context of what makes sense to people. I will return to this point more later, but for now, let me just observe that especially for the academically less inclined, schools try to introduce "things and situations that make sense to people" either by putting the student in vocational education or by linking schooling to outside jobs, as in organized part-time work and part-time school ventures. There can be good reasons for doing either of these things, but not as a way of compensating for the often impoverished learning contexts of academic courses. If earlier I argued that **all** students, not just the academically inclined, need to master higher order cognitive skills, now I am arguing that **all** students, not just the academically disinclined, need contextualized learning. This contrast implies that instruction should mirror life. How we do this, I am not sure, but I am talking about "vitalizing," not "vocationalizing," schooling. I suspect that the best teachers in our best schools already instinctively "vitalize" even the most "academic" of subjects, such as the fifth grade teacher in a McLean, Virginia school who runs a simulation of a small economy in the classroom to give her students experience with fundamental economic concepts such as competition, monopolies, bankruptcy, rents, or taxation. Reading a discussion of markets, sellers, and competition in a textbook means much more to a student who the day before has waged a price war with a seatmate to corner the market on hot dog sales. "Taxation" means much more when another seatmate who represented government has bought the classroom door, forcing everyone to pay taxes every time they need to go in or out of the room--for example, to get water to boil their hot dogs.

The fourth contrast--**generalized learning in school versus situation-specific competencies outside**--seems to me to have more implications for how we structure straightforwardly vocational education, whether the objective is to train automobile mechanics, laboratory technicians, or lawyers. This contrast seems to imply relying heavily on apprenticeship-like arrangements, either actual or simulated, to help students achieve what Sylvia Scribner identifies as a hallmark of expert performance in a wide range of jobs: fine-

tuning performances to the environment and using setting-specific knowledge effectively.

The final research strand involves **at-risk learners as rational decision-makers.** By at-risk learners I mean those who do not perform well in traditional schools or training programs arranged like traditional schools, either because they are not very good at standard academic subjects or--and this is an exceedingly important "or"--because they do not **want** to be or do not see **the point** of being good at them. It is important to note that although at-risk learners come disproportionately from poor families, almost everyone in this audience either has or has had a child of this sort or friends with a child of this sort. **No group escapes this problem.**

In thinking through how schools can connect better to at-risk learners, I want to start by questioning the frequent assumption that at-risk and not-at-risk populations differ in how they learn most effectively. Although it is an empirical issue, I suspect two things. First, variations in learning performances may attest partly to individual differences in the willingness to tolerate or make some sense out of a school-based or school-like experience that is relatively isolated from non-school experience. And, second, these differences in turn may partly reflect differences between at-risk and not-at-risk learners in their visions of their adult "places" in the world.

I suggest that all individuals develop an image of their niche in the adult world--in the ecological sense of niche. Their ideas about the ecology of adult "places" may be distorted and are usually pitifully and pathetically partial. However, the research shows that they work out notions of their basic futures and of the trajectories relevant to them, even if they cannot state these explicitly. **And they act on these ideas**--such as electing into or out of advanced mathematics in high school, depending on their sense of occupational destination.

For example, I analyzed data from a national longitudinal survey of youth, concentrating on the fourteen to seventeen year olds in the sample. The purpose was to understand the dynamics that underlie the traditionality of young girls' occupational choices. What drove these girls' occupational preferences were fundamental choices about what kinds of commitments they expected to make as adults. The adult agendas that these girls had for themselves revolved around the basic issue of family versus work. Their commitment to one or the other (or to some balance between them) drove the traditionality of their occupational choices, which in turn drove the future educational investments that they expected to make. We can note that these agendas were fully developed even for the fourteen year olds, indicating that their concepts of their futures had to have been forming well before the age of fourteen.

I doubt that these girls knew that many of their future plans simply cascaded from and elaborated a fundamental choice of direction. In other words, I do not think that most of these girls could have cogently described the structure of choices that lay so clearly in the data. Nonetheless, I suggest that the basic behaviors of all individuals, at-risk and not-at-risk,

can be interpreted from the perspective of what they can envision for themselves.

For example, I suggest that the girl who becomes the teenage mother, although we hear a great deal about her "wanting someone to love," is more fundamentally taking the action that lets her occupy the niche of "mother" a place in the adult firmament that best fits how **she** sees her talents and opportunities. (Never mind the destructive potential of that choice that **we** can see.) From this perspective a decision to keep the baby is essential to implementing her sense of place in the work--and our attempts to contain the damage of teenage pregnancy by trying to persuade her to put the baby up for adoption attests more to our dimness than to hers.

The individual who scrapes by to high school graduation, or who drops out--or behaves so intolerably that he or she is pushed out, may not be able to envision and emotionally claim an adult future that requires the core curriculum of the high school. When schools concentrate on narrow verbal and mathematical-logical **skills,** though Lord knows that these are important, I suggest that we may inadvertently limit their vision to **jobs** that are highly academic in content, whereas in fact only a small share of total jobs are of this nature. As Howard Gardner, the Harvard psychologist and author of **Frames of Mind**, noted in an interview with the **New York Times**, "We subject everyone to an education where, if you succeed, you will be best suited to be a college professor." (November 9, 1986, Education Section, **New York Times**, p.23)

And if a person cannot envision participating in adult jobs that are highly academic in content, two things happen. First, the individual cannot look to the school for his or her sense of ultimate place and trajectory--he or she must look elsewhere, and the school, in a basic sense, has lost that individual. And second, instruction in academic skills will become "irrelevant" to the person--or, in decision theory terms, without "utility". Decision theory presumes and countless studies show that individuals--children and adults, at-risk and not-at-risk, do things that have utility for them--that connect to what they want and where they expect to be going.

In sum, the contrasts between in-school and out-of-school mental activity that Resnick describes suggest that school-based learning is not particularly related to out-of-school activity for any individual. If school is head, out-of-school--**everyone's** out-of-school--is head and hand, mind and environment. However, what we teach in traditional schools and in many basic skill remedial programs and how we teach it seem least relevant to those individuals who lack the ability, or confidence, or desire to engage in concentrated symbol-based activity outside of school, such as the professional occupations. From this perspective, traditional schools and schooling may be creating their own problems in reaching their own learning goals and helping to produce the "at-risk" learner.

Let me stop there and take questions.